

Appl'n. No. 09/545,516  
Response dated May 13, 2004  
Reply to Office Action of Nov. 20, 2003

## REMARKS/ARGUMENTS

### **I. Introduction**

Applicants sincerely thank the Examiner for granting an interview to discuss the present Office Action.

#### **A. Status of Claims**

- Claims 1-47 remain in this application.
- Claims 1, 7 and 29 are the only independent claims under review.
- Claims 1, 4, 7, 17, 28-29 and 31 are currently amended.
- Claim 17 stands objected to because of informalities.
- Claim 28 stands rejected under 35 U.S.C. § 112.
- Claims 1-5, 7-16, 25-38 and 47 stand rejected under 35 U.S.C. § 102(b).
- Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over **Bier et al.**, "Intelligent Sensor Management for Beyond Visual Range Air-to-Air Combat," in view of **Shigematsu et al.**, US pat. No. 5,704,016.
- Claims 18-24 and 40-46 stand objected to as being dependent upon a rejected base claim, but would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims.

#### **B. Interview Summary**

Applicants appreciate and thank the Examiner for extending courtesy to the Applicants and their representatives during an interview on Thursday, May 13, 2004 to discuss the present Office Action. During the interview, Applicants, Applicants' representatives and the Examiner discussed rejection issues regarding a sensor management system in the Office Action.

Specifically, the Examiner rejected Applicants' claims based on the notion that the words "secure management system" have been discussed in the **Bier** reference. Applicants explained that the present invention is distinguishable from **Bier** in that the present invention incorporates the scheduling of sensors by considering the operational characteristics of the sensors to perform a particular task. In contrast, **Bier** merely prioritizes sensors to perform a particular task.

Applicants and their representatives submitted proposed claim amendments to pinpoint this distinction by changing the notion of "selecting" sensors to "scheduling" sensors. However, Examiner pointed out that the plain language meaning of the term "scheduling" by itself may not be sufficient to distinguish against **Bier**. Thus, to further clarify this distinction, Applicants, their representatives and Examiner agreed that amending the claims to reflect that the

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"scheduling" considers "operational characteristics" of sensors is sufficient to overcome Bier.

## II. Claims

### A. Claims are amended.

Independent Claims 1, 7 and 29 and Dependent Claim 4 are amended to introduce the concept of "scheduling" to claim more accurately the present invention. As amended, claims 1, 4, 7 and 29 now emphasize that the sensor management system "schedules" at least one sensor whose "operational characteristics" are capable of performing a measurement function.

Dependent Claim 17 is amended to properly depend on Dependent Claim 15.

Dependent Claim 28 is amended to overcome the indefiniteness rejection. As amended, claim 28 now states that the method of managing a sensor system further comprises the step of monitoring the health and utilization of a system to automate the system.

Dependent Claim 31 is amended to state that the "sensor selection involves giving preference to sensors that are capable of achieving the required level of detail but that are at least capable of exceeding the required level of detail."

### B. Rejection under 35 U.S.C. § 112 is noted.

Dependent Claim 28 is currently rejected for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

Applicants have amended Claim 28 to overcome indefiniteness by amending Claim 28 as follows: "The method of claim 7, further comprising the step of monitoring the health and utilization monitoring of a system in order to automate [[a]] the system." Support for this claim is found in the specification of the application on page 12, lines 2-7.

In view of the amended Claim 28, Applicants respectfully request withdrawal of this rejection.

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**C. Rejections under 35 U.S.C. § 102(b) are improper.**

1. The rejections to Independent Claims 1, 7 and 29 are improper because **Bier** does not teach a "sensor management system" that is capable of scheduling sensors. The scheduling of sensors is an important aspect of the present invention.

A big difference between **Bier** and the present invention is the scheduling of sensors. **Bier** does not disclose this feature. The present invention does.

Specifically, **Bier** uses a sensor/track switchboard, which is a two-dimensional matrix that indicates which sensors can be applied to which tracks. See Bier, "Switchboard Operations," p. 266, col. 1, lines 24-32. Each element either exercises a "0" or a "1" as its Boolean switch, where a "1" means a sensor cannot be applied to a track and where a "0" means a sensor can be applied to a track. Id. After the matrix is established, **Bier** prioritizes all the possible services that can be provided for each track. See Bier, "Track Service Prioritization," p. 266, col. 2, lines 1-3. Once prioritization is complete, **Bier** then selects the best sensors for assignment to sensors within the Sensor Load Allocation according to the Greedy Service Algorithm (GSA). See Bier, "Sensor Load Allocation," p. 267, col. 1, lines 10-15, p. 268, col. 1, lines 42-46. This selection may be performed using "IF ... THEN" rules. Id. at lines 56-58. If a best sensor cannot be found, then **Bier** would attempt to choose a sensor according to a predetermined hierarchy. Id. at p. 268, col. 2, lines 21-22. "If no sensor can be found to perform a given service, then allocation will proceed with the next highest priority service." Id. at p. 268, col. 2, lines 23-25.

In contrast, the present invention teaches a scheduling of sensors. Called the Sensor Scheduler, it deals with intrasensor issues. "It only needs to concern itself with the optimal packing of these [estimated] measurements into the time allotted as well as distributing the measurement tasks among the available sensors while simultaneously keeping the load balanced and assuring that all sensors are utilized to their maximum capability." See Specification, p. 10, lines 20-24. One embodiment of the present invention uses the On-line, Greedy, Urgency-driven Pre-emptive Scheduling Algorithm (OGUPSA) to accomplish the scheduling of sensors. Id. at p. 16, lines 15-21.

OGUPSA is different from GSA. OGUPSA "combines aspects from the computer science unit execution task (UET) problem for jobs of equal value with the greedy search algorithms from operations research (OR) to accomplish the most with the least, along with the real-time aspects of high-priority (urgent) tasks which preempt tasks of lower

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value." See Specification, p. 11, lines 14-17. "This approach optimizes the scheduling of prioritized tasks of non-uniform difficulty among a heterogeneous, not necessarily collocated, set of resources which can accomplish the tasks." Id. at lines 17-19. GSA, on the other hand, which is essentially "a depth first search of a subset of all possible sensor arrangements," merely "assumes that services greedy in the sense that the highest priority service will always demand to be assigned to the 'best' available sensor to perform the service." See Bier, "Sensor Load Allocation," p. 267, col. 1, lines 11-15.

However, regardless of the implemented scheduling methodology, one of the problems that the present invention addresses is a set of constraints, including time constraints. See Specification, p. 11, lines 20-23. Nowhere in Bier are constraints, let alone time constraints, disclosed.

To address this difference, Applicants have amended Independent Claims 1, 7 and 29 to claim that the sensor management system schedules at least one of the sensors whose operational characteristics are capable of performing a selected management function. See supra, Amendments to the Claims. Applicants believe that this minor amendment better claims the present invention and overcomes Bier.

Applicants believe Independent Claims 1, 7 and 29, as amended, now overcome Bier. Hence, Applicants respectfully request the withdrawal of these rejections.

2. Applicants believe that with Independent Claims 1, 7 and 29, as amended, overcoming Bier, the rejections to Dependent Claims 2-6, 25-28, and 30-39 and 47 are now improper. These dependent claims are dependent upon the independent claims and include all of the limitations of the independent claims. Thus, Applicants respectfully request the withdrawal of the rejections to these dependent claims.

**D. Rejection under 35 U.S.C. § 103 should be overcome.**

The rejection of Claim 6 under 35 U.S.C. § 103(a), is currently rejected as being unpatentable over Bier et al. in view of Shigematsu et al.

Applicants believe that Independent Claim 1, as amended, is now in condition for allowance. Because Claim 6 depends on Independent Claim 1 and includes all the limitations of Independent Claim 1, Dependent Claim 6 is also now in condition for allowance and thus overcomes the obviousness rejection. Thus, Applicants respectfully request the Examiner to remove the 35 U.S.C. § 103 rejection on Dependent Claim 6.

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**E. The remaining prior art references of record do not anticipate the present application.**

Applicants also thank the Examiner for her consideration of Lopez et al., "Fuzzy Reasoning for Multisensor Management," Chaudhuri et al., "Adaptive All-Source Data Fusion System Development," Rothman et al., "Evaluation of Sensor Management Systems," Burks et al., US pat. No. 6,002,996, Juengel et al., US pat No. 4,254,472, Friedrich et al., US pat No. 5,958,009, Yashara et al., US pat No. 4,531,193, and Mehnert et al., US pat No. 4,807,149. However, Applicants believe that like Bier, these references do not anticipate the present invention.

**III. Conclusion**

For all of the reasons advanced above, Applicants respectfully submit that the application is in condition for allowance and that action is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' agents at the telephone number shown below.

The Commissioner is hereby authorized to charge any additional fees, which may be required, or credit any overpayment, to Deposit Account No. 501450.

In the event that an extension of time is required, or may be required in addition to that requested in a petition for an extension for time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 501450.

Respectfully submitted,



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